Argonne
NATIONAL LABORATORY

HELPING CATERPILLAR AND CUMMINS
ACCELERATE ENGINE DEVELOPMENT AND SLASH COSTS

THE OPPORTUNITY

Heavy equipment manufacturers are always looking for ways to more efficiently produce engines that have better fuel economy, are more reliable, last longer, etc. However, that process is complex, time-consuming and expensive.

The heavy equipment industry is global and highly competitive, so the race for innovative solutions that help companies gain market share is fierce.

It was within this context that heavy equipment manufacturing giants Caterpillar (Deerfield, Ill.) and Cummins (Columbus, Ind.) began working with the U.S. Department of Energy's Argonne National Laboratory and software developer Convergent Science, Inc. (Madison, Wis.) to look at ways to improve their engine development processes.

THE COLLABORATION

Argonne has developed engine models and software for computer simulations that provide — in virtual space, before costly physical production ever begins — a better understanding of how engine parameters interact.

Caterpillar, Argonne and Convergent Science conducted simulations of a Caterpillar engine, helping reduce the time and cost of new engine development and enabling the adaptation of fuels from new sources, as well as substantial increases in fuel economy.

Cummins, Argonne and Convergent Science conducted simulations on Cummins engine products, focusing on fluid dynamics of fuel injectors. Argonne's fuel spray modeling and advanced load-balancing algorithm capabilities allow for more reliable analytical calculations, lower dependence on experimental engines and prototypes, and accelerate new engine concepts and designs to market.

THE IMPACT

As a result of their respective collaborations with Argonne and Convergent Science, Caterpillar and Cummins have been able to:

☐ Significantly reduce the number of experimental test campaigns

☐ Shrink engine development timescales

☐ Significantly lower the cost of engine development

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